Part 2 - Response

Reconsideration of the Sections 112 and 102 rejections set forth in the office action of March 6, 2003 is respectfully requested. A petition for one month extension of time and the fee therefor accompanies this Response, thereby extending the time for response to July 6, 2003.

Claims 1-12 and 27-29 are pending. The form of these claims is shown in Part 1 of this Response.

Section 112 Rejection

This rejection in the March 6, 2003 office action includes the following statement:

> Claims 1-12, 27-29 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for an optical wave guide having a graded index of refraction with an integrated circuit, does not reasonably provide enablement for the graded index of refraction. The specification does not enable any person skilled in the art to which it pertains, or with which it is most merely connected, to use the invention commensurate in scope with these claims. (Page 2)

The rejection then proceeds to assert "(t)he term 'graded index of refraction' is a well-established term in the art for an index of refraction continuously varying within the same material, or within layers of different materials fused together." The rejection further asserts that the specification states a different definition for graded index of refraction. However, the rejection does recognize that the specification defines the different materials as having their own different indices of refraction.

Section 112, first paragraph, states "The specification shall contain a written description of the invention, . . as to enable any person skilled in the art . . to make and use the same." Accordingly, the specification must contain an enabling

description of the "invention." The PTO recognizes that it is the claim language that must be enabled:

> The invention that one skilled in the art must be enabled to make and use is that defined by the claim(s) of the particular application or patent. MPEP 2164.
>
> All questions of enablement are evaluated against the claimed subject matter. The focus of the examination inquiry is whether everything within the scope of the claim is enabled. Accordingly, the first analytical step requires that the examiner determine exactly what subject matter is encompassed by the claims. MPEP 2164.08

Clearly, therefore, the test for enablement must be determined by the language of the claims, i.e. the invention. Also see Ex parte Erlich, 3 USPQ2d 1011, 1104 (BdPatApp&Int 1986).

Reference to the pending claims 1-12 and 27-29 reveals that the term "graded index of refraction" is entirely absent from those claims. Instead, the claims recite the relative differences in indices of refraction of the core, the refractive layer and the dielectric material. The specification clearly enables the relative differences in the refractive indices of the core, refractive layer and the dielectric layer, as the rejection itself admits: "Each material–the dielectric material, refractive layer and core–has its own constant index of refraction . ." (Page 2). Similar acknowledgments of enabling disclosure for different indices of refraction for the claimed dielectric material, reflective layer and core are found in the previous October 3, 2002, April 10, 2002 and October 23, 2001 office actions at page 2, respectively.

The citation of Multiform Desiccants Inc. v. Medzam Ltd., 45 USPQ2d 1492 (Fed. Cir. 1999) further demonstrates the inappropriate nature of the present Section 112 rejection. The *Multiform Desiccants* case involved the meaning or construction of the word "degradable" which was specifically used in the claims.

Here, the present rejection recognizes that the term in dispute "graded index of refraction" is not used in the claims. Clearly, the *Multiform Desiccants* case does not support the present rejection, but instead supports the position that proper Section 112 enablement rejections apply to only the invention, i.e. the claim terms.

The applicant has previously explained that the description in the specification is not inconsistent with the Examiner's definition of a graded index of retraction. "Fused" is an ambiguous term, but apart from its ambiguity, there is nothing in the specification which says that the layers described in the specification are not fused.

The issue with respect to the Section 112 rejection relates to differences of opinion regarding the description in the specification, not language used in the claims. There is no difference of opinion concerning enablement of the claim language, because enablement for the claim language has been admitted. Accordingly, the Section 112, first paragraph, rejection is inappropriate, has no basis in law, and should be withdrawn.

Section 102 Rejection

Claims 1-4, 11, 12 and 27-29 have been rejected under Section 102(b) as anticipated by Lee, U.S. patent 5,281,305. Claims 5-10 have not been rejected on substantive prior art grounds.

The rejection based on Lee is one of inherent anticipation. The rejection recognizes that the Lee patent does not disclose the relative differences of indices of refraction of the core, refractive layer and dielectric material recited in the claims. (Page 4.) Nevertheless, the rejection states "this feature is seen to be an inherent teaching of that device since the refractive layer of Lee's apparatus, which is made of borosilicate glass, has greater index of refraction than the index of refraction of the dielectric layer made of silicon dioxide . . As to the refractive index of the core 20, it has to be greater than the refractive index of the refractive layer, otherwise it would not be able to guide light . ." (Page 4.)

The Lee reference has been asserted in previous obviousness rejections, under circumstances where Lee was also admitted as failing to describe features of the claimed invention. Accordingly, the present and previous office actions have consistently recognized Lee's failure to describe the claimed invention.

Inherency may be properly used in an anticipation rejection when (a) the prior art reference from which inherency is claimed is silent with respect to the allegedly inherent feature, and (b) the allegedly inherent feature necessarily, inevitably and invariably occurs from the subject matter which is disclosed in the prior art reference. If the allegedly inherent feature is only possible or probable, an inherency rejection is inappropriate. See MPEP 2112, Ex parte Levy, 17 USPQ2d 1461, 1463-1464 (BdPatApp&Int 1990), In re Robertson, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999), Trintec Industries Inc. v. Top-U.S.A. Corp., 63 USPQ2d 1597, 1599 (Fed. Cir. 2002) and Rosco v. Mirror Lite Co., 64 USPQ2d 1676, 1680 (Fed. Cir. 2002).

In the present case, the inherent anticipation rejection based on Lee is incorrect because Lee is not silent on the allegedly inherent feature. In fact, Lee specifically describes subject matter which is directly contrary to the allegedly inherent subject matter. Specifically, Lee states that the "refractive index of borosilicate glass and silicon dioxide are nearly equal." (Column 3, line 66-67.) To further emphasize the equality in the refractive indices of the borosilicate glass and the silicon dioxide, Lee shows in Fig. 13 an optical representation of his structure in which only two waveguide materials exist, the phosphosilicate glass 20 and the 7059 glass 30, each surrounded by the silicon dioxide 10. The Fig. 13 optical representation shows only two materials because the borosilicate glass has the same index of refraction as the silicon dioxide, causing these two materials to be represented optically by a single surrounding medium. "Waveguides 20 and 30, therefore, essentially reside in a single index medium within medium acting as a cladding thereabout." (Column 4, lines 1-3.)

The pending claims recite that the refractive layer must have a greater index of refraction than the dielectric material, in contrast to Lee who specifically states that the borosilicate glass has nearly the same index of refraction as the silicon dioxide. The optical representation of the Lee structure, shown in Fig. 13, confirms that only two, not the claimed three, indices of refraction are described in Lee.

Accordingly, Lee is not silent on the relative indices of refraction of three materials. In fact, Lee specifically addresses the allegedly inherent claimed subject matter by stating that the borosilicate glass (refractive layer) has the same index of refraction as the silicon dioxide (dielectric material). The specific disclosure in Lee is therefore contrary to the allegedly inherent information relied on in the rejection.

The inherent anticipation rejection attempts to rewrite Lee by substituting information selected by the Examiner for Lee's specific disclosure, and on that basis seeks to reject the claims. Substituting information contrary to the specifically disclosed information in a prior art reference is not an appropriate basis for an inherent anticipation rejection.

Substituting information which is allegedly more favorable for a rejection for the specific contrary disclosure in Lee cannot demonstrate that the substituted information necessarily, inevitably and invariably occurs. Indeed, Lee's contrary explanation demonstrates that the information which the rejection seeks to substitute can not necessarily, inevitably and invariably flow from Lee's disclosure, because Lee himself describes the invention completely differently.

Even if Lee was silent on the indices of refraction of the materials described in his patent (which is not the case), the inherent anticipation rejection would still be inappropriate. The Duke Scientific reference is relied in the rejection for the proposition that borosilicate glass has a greater index of refraction than silicon dioxide, but the Duke Scientific reference does not demonstrate that borosilicate

glass necessarily, inevitably and invariably has an index of refraction greater than silicon dioxide in the context of the claimed subject matter, without possibility or probability of a different circumstance.

The information of one of the present inventors is that the indices of refraction of borosilicate glass and silicon dioxide are nearly equal, just as Lee states. See attached declaration of Verne Hornback.

Further still, the Duke Scientific reference relates to the indices of refraction of microspheres, not the typical integrated circuit-like structure defined in the present claims and described in the specification and in the Lee reference. As stated in Mr. Hornback's Declaration, it may be possible that the fabrication technique used to create the borosilicate glass microspheres has caused the different index of refraction.

As Mr. Hornback also observes, the Duke Scientific reference does not state the percentage of boron in the borosilicate glass. The percentage of boron may possibly have an effect on the index of refraction.

Accordingly, the Duke Scientific reference is not evidence that the index of refraction of borosilicate glass necessarily, inevitably, and invariably is greater than the index of refraction of silicon dioxide, with no possibility or probability of different relative indices of refraction. The Duke Scientific reference is simply not adequate evidence upon which to base an inherent anticipation rejection, because its information only demonstrates a possibility or probability of differences in indices of refraction.

Accordingly, the inherent anticipation rejection is incorrect, because the rejection is not consistent with the law of inherent anticipation, and because the evidence cited in support of inherent anticipation based on Lee does not demonstrate that the three different claimed materials have the claimed relative differences in indices of refraction as a necessary, inevitable and invariable occurrence without possibility or probability of a contrary situation.

Conclusion

The pending claims are patentable over Lee. The Section 112 rejection is inappropriate because the language which allegedly is not enabled is not part of the invention as claimed. The pending claims are not anticipated directly or inherently by Lee, because Lee specifically describes a structure which is different from that claimed and the claimed subject matter is not inherent from Lee. Accordingly, it is requested that this application be allowed.

Respectfully submitted,

Date: 7/02/03

By: _____

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PATENT
Attorney Docket No. 98-027

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Verne C. Hornback and Derryl D.J. Allman	Group Art Unit: 2877
Serial No. 09/217,183	Confirmation No. 8652
Filed: December 21, 1998	Examiner: L. G. Lauchman
For: ON-CHIP GRADED INDEX OF REFRACTION OPTICAL WAVEGUIDE AND DAMASCENE METHOD OF FABRICATING THE SAME	

#19
S. Kang
7/18/03

DECLARATION OF VERNE C. HORNBACK

I, Verne C. Hornback, one of the inventors of the above patent application, declare follows:

1. I have reviewed U.S. patent 5,281,305 to Lee et al., and note that at column 3, lines 66-67, the patent describes the index of refraction of borosilicate glass as nearly equal to the index of refraction of silicon dioxide. I agree with this statement.

2. My own experience in measuring the index of refraction of borosilicate glass typically used in semiconductor fabrication shows that its index of refraction is very nearly equal to the index of refraction of silicon dioxide, just as is stated in the Lee patent.

3. I have also reviewed the Duke Scientific Corporation paper titled "Index of Refraction" which gives indices of refraction for polystyrene microspheres, silica microspheres, borosilicate glass microspheres and soda lime glass microspheres. The index of refraction for the borosilicate glass microspheres described in that paper is higher than I have observed for layers of borosilicate glass applied in semiconductor fabrication techniques similar to those described in my above identified patent application and similar to those described in the Lee patent.

4. There may be a possibility that the fabrication process used to manufacture the borosilicate glass microspheres described in the Duke Scientific Corporation paper has increased the index of refraction of borosilicate glass.

5. The Duke Scientific Corporation paper does not describe the percentage of boron used in the borosilicate glass. There may be a possibility that an increased percentage of boron in the borosilicate glass could change its index of refraction compared to the percentage (typically less than four percent) of boron in the type of borosilicate glass typically used in semiconductor fabrication.

6. All statements made herein of my own knowledge are true, and all statements made on information and belief are believed to be true. The statements were made herein with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of this patent application or any patent issued thereon.

7/1/03
Date

Verne C. Hornback
Verne C. Hornback